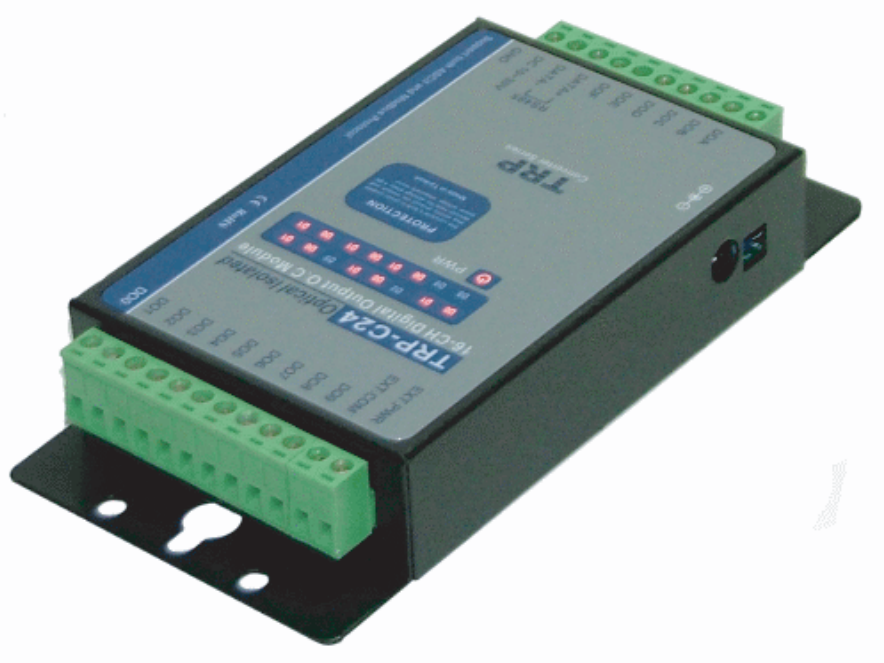
TRP-C24

16 channels digital output Isolated RS-485 Module, open collector. Support ASCII and Modbus RTU protocol



User's Manual

Printed MAR. 2007 Rev 1.0

Web: www.tpikorea.com

Copyright

Copyright Notice: The information in this manual is subject to change without prior notice in order to improve reliability, design and function and dosed not represent a commitment on the part of the manufacturer. No part of this manual may be reproduced, copied, or transmitted in any form without the prior written permission of manufacturer. Acknowledgment Products mentioned in this manual are mentioned for identification purpose only. Products manes appearing in this manual may or may not be registered trademarks or copyright of their respective companies.

1.Introduction

The TRP-C24, an isolated output open collector RS-485 module, provides 16 digital outputs channels that allow you output open collector signal (100mA) to driven your devices on RS-485 network. All channels feature screw terminals for convenient connection of field signals as well as LED's to indicate channel working status. All outputs are equipped with photo-couplers to protect the module against high voltage spikes, as well as ground potential differences. For easy user access, TRP-C24 can enter configuration mode and self-test mode with outer dip-switch. TRP-C24 support both ASCII and Modbus protocol, with a full set of command, dual watch-dog, and auto reset function the module can be remote controlled by PC in ASCII or Modbus RTU protocol.

1-1.Features

- Wide input range DC power supply.
- Support ASCII and Modbus RTU protocol.
- Supports baud rates from 1.2Kbps to 115.2 Kbps.
- Digital output signal with 3750Vrms isolation protection.
- Dual watchdog: Module's firmware, host computer traffic.
- LED for each channels working status.
- DIN-Rail and panel mount support.
- Configured and self-test by external dip-switch.
- Support screw terminal and external DC power adaptor.

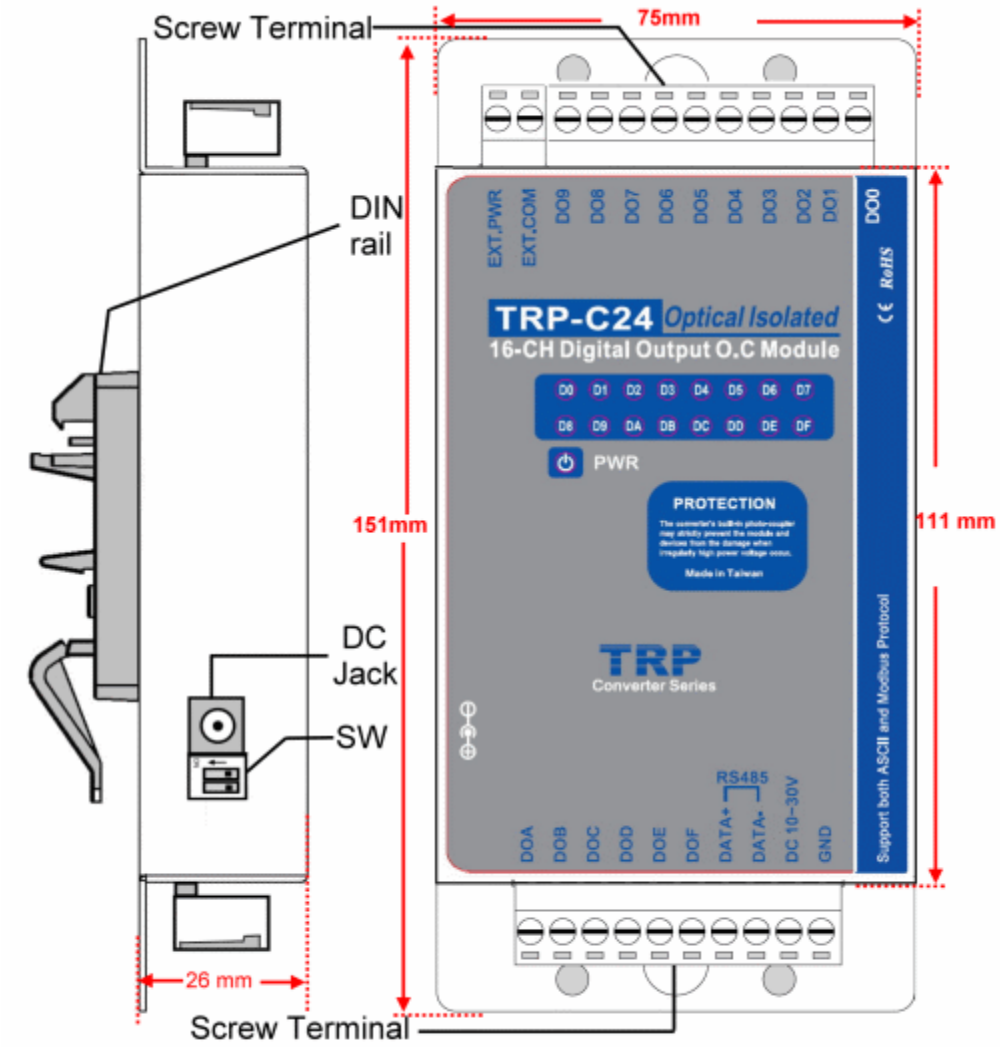
1-2.Specifications

- Power Input Voltage DC +10V to +30V.
- Protocol: ASCII and Modbus RTU.
- Output channel: 16 digital output channels (open collector).
- Digital output isolation: 3750Vrms.
- Communication interface: RS-485 differential 2 half/duplex wires.
- Communication speed form 1.2Kbps to 115.2Kbps auto-switching.
- Data format: Data bit: 8, Parity Check: None, Stop Bit: 1.
- Distance: up to 4000ft (1200M).
- Connection type: Screw terminal for maximum AWG# 12~30 wire.
- Signal LED: Power, and all output channels.
- Power supply: Screw terminal, or external DC adapter.
- Power consumption 1.5W.
- Operating environment: 0 to 65C.
- Storage temperature: -20 to 65C.
- Humidity: 10~90% Non-condensing.
- Dimension: 151mm X 75mm X 26mm.

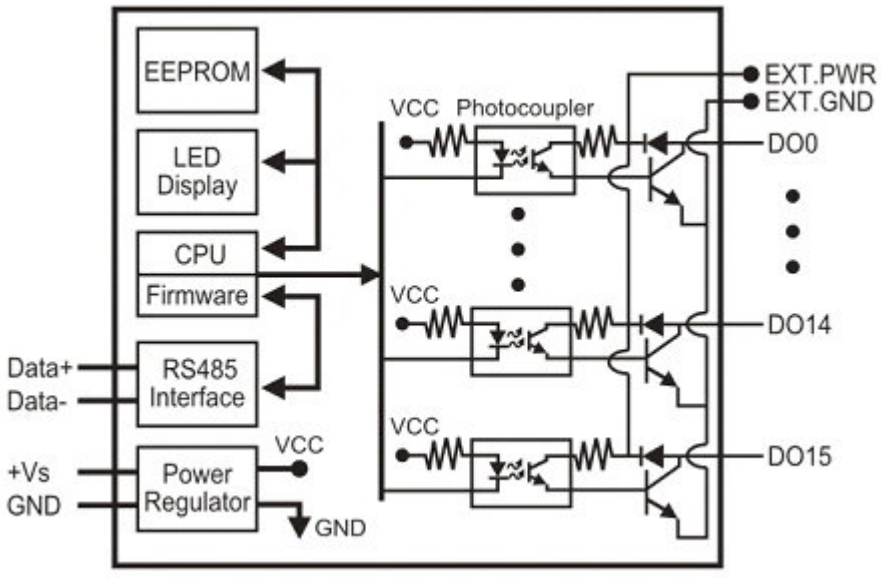
- Weight: 395g.
-

2. TRP-C24 Hardware Description

2-1. Panel Layout



2-2. Block Diagram

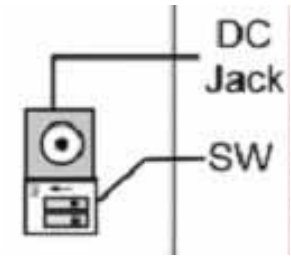


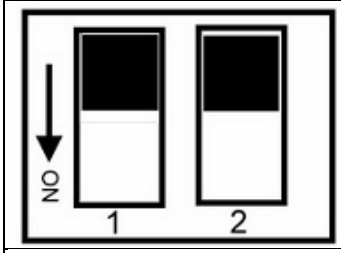
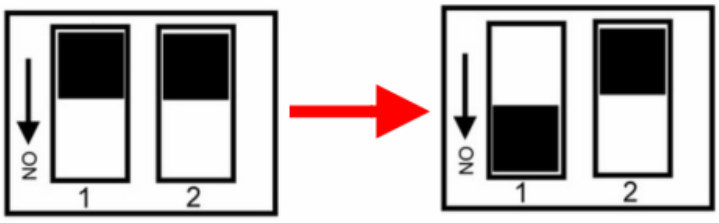
2-3. Pin Definitions

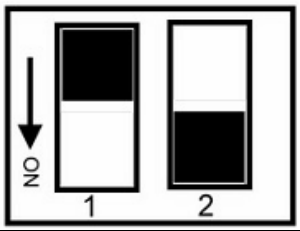
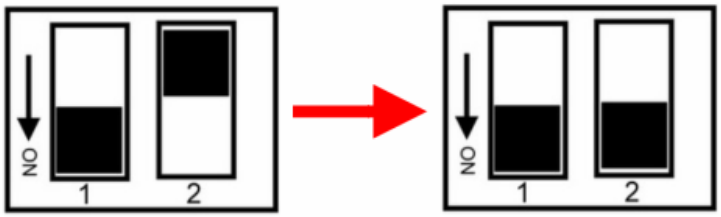
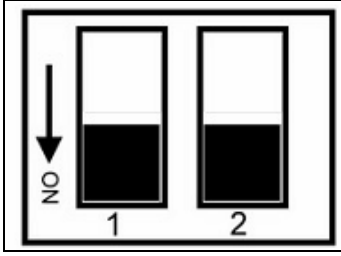
		EXT.PWR	External power for isolation Max.30V DC
		EXT.GND	External ground for isolation Max.30V DC
DIA	Digital output Channel 10	DI9	Digital output Channel 9
DIB	Digital output Channel 11	DI8	Digital output Channel 8
DIC	Digital output Channel 12	DI7	Digital output Channel 7
DID	Digital output Channel 13	DI6	Digital output Channel 6
DIE	Digital output Channel 14	DI5	Digital output Channel 5
DIF	Digital output Channel 15	DI4	Digital output Channel 4
DATA+	RS485+	DI3	Digital output Channel 3
DATA-	RS485-	DI2	Digital output Channel 2
DC 10~30V	Input DC 10~30V	DI1	Digital output Channel 1
GND	DC Ground	DI0	Digital output Channel 0

2-4. System Configuration Switch

The TRP-C24 support both Modbus/RTU and ASCII communication protocol which can be selected by a 2-pin dip-switch. The dip-switch also provides “back to initial” function when the configuration stored in EEPROM is missing such as ID (RS-485 Module address), baud rate and data format.



	**Modbus Protocol (Factory)** Modbus Communication Protocol. Adjust the switch to “off off” to “ position.
	**Back to INITIAL for Modbus** Step1. In power on mode, adjust the switch from “off off” to “on off” position. .Step2. Reboot TRP-C24

	**ASCII Protocol** ASCII communication protocol. Adjust the switch to “off on” position.
	**Back to INITIAL for ASCII** Step1. Adjust the switch to “on off” position Step2. Adjust the switch to “on on” position User may direct adjust the switch In power on status, no system reboot require.
	**Module self test** Step1. Adjust the switch to “on on” position Step2. Reboot.

***INIT: ID=00, Baud-Rate: 9600, Data format: 00.**

TRP-C24 Default setting:

ID Address :01,

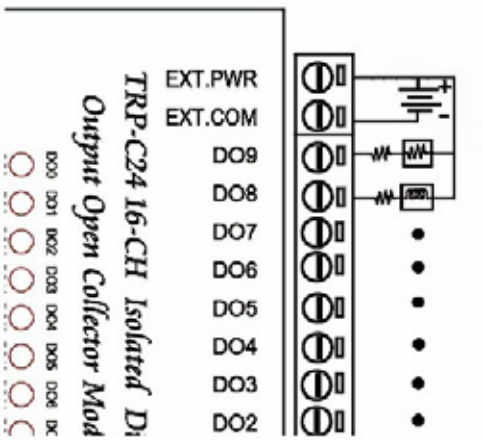
Baud Rate:9600,

DIO Mode Type :40,

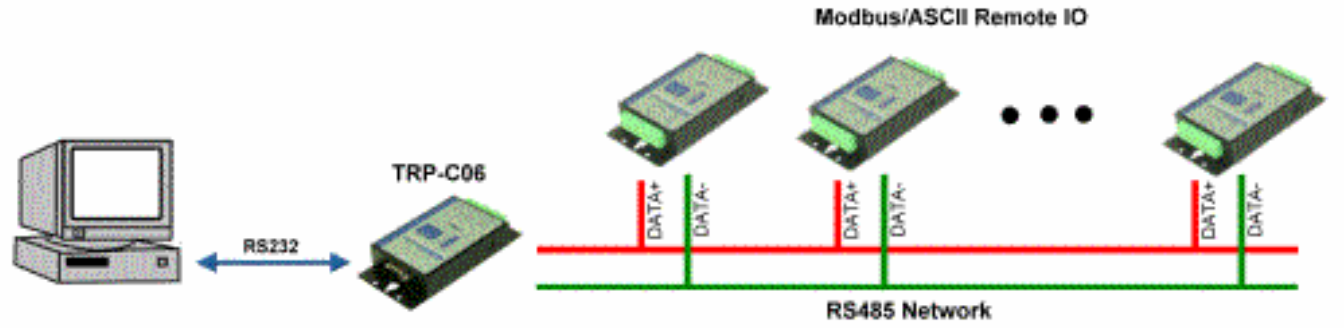
Checksum: Disable,

RS485 Communication data format:N,8,1.

2-5. Wire Connection for Digital Input



2-6.Communication Wiring



3. Function description

Power on mode: This is TRP-C24 normal working mode, TRP-C24 can accept the host's command to change the digital output value.

Dual Watchdog:
TRP-C24 provides Module and Host Watchdog. The module watchdog is a hardware watchdog. The host watchdog is a software watchdog. TRP-C24 watchdog is designed to automatically reset the microprocessor when the module fails. The host watchdog monitors the host controller (PC or PLC). The output of module can go to the safe Value State if the host fails.

Safe mode: If watchdog enable on the RS-485 line, the host will send the reset command("Host Ok!") to drive the watchdog timer re-count before timeout, when the host does not send the command before watchdog timeout, the module go to the safe mode. In safe mode, the digital output will not be changed until the watchdog disable.

4.TRPCOM Command Protocol Description

Command Format :"Leading Code"+"ID Address"+"Command"+"CHK"+(cr) .
at :"Leading Code"+"ID Address"+"Data"+"CHK"+(cr) .

5. How to calculate the checksum

1. Calculate all characters of the command string to get the ASCII sum, except the character return.
2. Mask the sum of string with 0FFH.

Example:
Send the command is "$06M".
Sum of string is "$"+"0"+"6"+"M"="24H"+"30H"+" 4D"="A1H"……The checksum and [CHK]="A1".
Response string with checksum is :" A1".

6. TRPCOM ASCII Command List

Command List	Function Description	Page Index
%IDNNPPBBDD(CHK)(cr)	**Set the module's configuration**	See 6-1~6-3
#IDPPFD(CHK)(cr)	**Digital Output Data**	See 6-4
$ID6(CHK)(cr)	**Read digital input/output status**	See 6-5
$ID2(CHK)(cr)	**Read the module's configuration**	See 6-6~6-7
$IDRS(CHK)(cr)	**Reset the module**	See 6-8
$IDM(CHK)(cr)	**Read the module's name**	See 6-9
$IDF(CHK)(cr)	**Read the module's firmware version**	See 6-10
$ID5(CHK)(cr)	**Read reset states**	See 6-11
~IDONN(CHK)(cr)	**Change the module's name**	See 6-12
~IDLEDA(CHK)(cr)	**Set the module's LED operating mode**	See 6-13
~IDWENN(CHK)(cr)	**Enable watchdog and set the timeout value**	See 6-14
~IDWD(CHK)(cr)	**Disable watchdog**	See 6-15
~IDWR(CHK)(cr)	**Read watchdog timeout value**	See 6-16
~**(CHK)(cr)	**System stand by (Host OK!)**	See 6-17
~ID4V(CHK)(cr)	**Read power on/safe value**	See 6-18
~ID5V(CHK)(cr)	**Save exiting digital output states to power on or safe mode**	See 6-19
#**(CHK)(cr)	**Save existing digital input states**	See 6-20
$ID4(CHK)(cr)	**Read synchronized data**	See 6-21

*User can save the output value by using the command "ID5V"

6-1 Set the module's configuration

Command	%IDNNPPBBDD(CHK)(cr)	
Syntax Description	%	First leading code
	ID	Address of setting module 00-FF(HEX)
	NN	New address of setting from 00-FF(HEX)
	PP	The Digital I/O module type define to 40
	BB	Set new baud rate (See 6-2)
	DD	Data format (See 6-3)
	CHK	Checksum
	(cr)	Carriage return
Response	!ID(CHK)(cr)	Command valid
	?ID(CHK)(cr)	Command Invalid

6-2 Baud rate setting (BB)

Code number	03	04	05	06	07	08	09	0A
Baud rate	1200	2400	4800	9600	19200	38400	57600	115200

6-3 Data format setting (DD)

Bit	7	6	5	4	3	2	1	0
Function	0	Checksum 0:Disable 1:Enable	0	0	0	0	0	0

Example:
Send command: " %0001400600 " ⋯.If you turn on the system setting switch, the ID will be reset to " 00 " .

New ID is 01 " ,D I/O type is 40 " ,Bard-Rate:9600 ,Checksum setting disable is " 00 " , Response: " **!01**".

Example:
Send command:%0003400540⋯.New ID= " 03 " ,Bard-Rate= " 4800 " ,Checksum= " Enable " ,Response: " **!03**".

6-4. Digital Output Data

Command	#DPPFD(CHK)(cr)	
Syntax description	#	First leading code
	ID	Address of setting module 00-FF(HEX)
	PP	D I/O type :0A or 00 low byte data D0-D7 (Multi-Channel) :0B high byte data D8-D15(Multi-Channel) :1L or AL: low byte data D0-D7 (Single-Channel) L=0-7 :BL : high byte dataD8-D15(Single-Channel) L=0-7
	DD	DD: Sent the data from 00~FF
	CHK	Checksum
	(cr)	Carriage return
Response	>(CHK)(cr)	Command valid
	!ID(CHK) (cr)	Parameter invalid (*Command data error !)
	?ID (CHK)(cr)	Command Invalid

*Multi-Channel mode (Output control for one Byte)

Example:
Send command : " #010A0F"…..Data="0F":DO0~DO7="11110000".
Response: " > " ……. Command valid.

Example:
Send command: " #010B26"…..Data="26":DO8~DO15="01100100"
Response: " > " ……. Command valid.

Example:
Send command: " #01000G"…Data="0G"…….Data error!.
Response: " !01 " …….Parameter error!.

*Single-Channel mode (Output control for one Bit)

Example:
Send command: " #011001 " ….. Data="01":DO0="1".
Response: " > " ……. Command valid.

Send command: " #011201 " ….. Data="01":DO2="1".
Response: " > " ……. Command valid.

Send command:#01B301……Data="00":DO11="1".
Response: " > " …….Command valid.

6-5. Read digital input/output status

Command	$ID6(CHK)(cr)	
Syntax description	$	First leading code
	ID	Address of setting module 00-FF(HEX)
	6	Read digital output status
	CHK	Checksum
	(cr)	Carriage return
Response	!IDHHLL(CHK)(cr)	HH=DO15~DO8 status, LL=DO7-DO0 status
	?ID(CHK) (cr)	Command Invalid

Example:
Send command:$016…….Read digital output states .
Response: " !01C345"…….DO15~DO8="11000011", DO7~DO0="01000101".

6-6. Read the module's configuration

Command	$ID2(CHK)(cr)	
Syntax description	$	First leading code
	ID	Address of setting module 00-FF(HEX)
	2	Read configuration
	CHK	Checksum
	(cr)	Carriage return
Response	!IDPPBBDD(CHK)(cr)	Command valid PP: Digital I/O type=40 BB: Baud rate DD=Data format (See data format table) Module model: BIT 2~0="000" TRP-C28 "001" TRP-C24 "010" TRP-C26
	?ID(CHK)(cr)	Command Invalid

6-7.Data format table

Bit	7	6	5	4	3	2	1	0
Function	0	Checksum 0:Disable 1:Enable	0	0	0	0	0	0

Example:

Send command:$012…Read configuration .

Response: " !01400641" DIO type=40,Baud-Rate=9600 (See 7.2) ,

Data Format=41 ,Checksum= Enable, Module model:1….TRP-C24 (See 6-7).

6-8. Reset the module

Command	$IDRS(CHK)(cr)	
Syntax description	$	First leading code
	ID	Address of setting module 00-FF(HEX)
	RS	Reset the module
	CHK	Checksum
	(cr)	Carriage return
Response	!ID(CHK)(cr)	Command valid
	?ID(CHK) (cr)	Command Invalid

Example:

Send command: " $01RS " …… Reset TRP-C24.

Response: " !01 " ……..Have been reset.

*Reset will clear all digital output states.

6-9. Read the module's name

Command	$IDM(CHK)(cr)	
Syntax description	$	First leading code
	ID	Address of setting module 00-FF(HEX)
	M	Reading module's name
	CHK	Checksum
	(cr)	Carriage return
Response	!IDNNNNNN(CHK)(cr)	NNNNNN :The chars from 1 –6 chars
	?ID(CHK)(cr)	Command Invalid

Example:

Send command:$01M…Read the TRP-C24 ' s name.

Response:"!01TRPC24"…… The module's name is "TRPC24".

6-10. Read the module's firmware version

Command	$IDF(CHK)(cr)	
Syntax description	$	First leading code
	ID	Address of setting module 00-FF(HEX)
	F	Command for reading module's version
	CHK	Checksum
	(cr)	Carriage return
Response	!IDMODMMYY(CHK)(cr)	MOD :The module's model MM:Release Month YY :Release Year
	?ID(CHK)(cr)	Command Invalid

Example:

Send command:$01F…Read the TRP-C24 ' s version.

Response:"!01C240605"……. The TRP-C24's version date is "06/2005".

6-11. Read reset states

Command	$ID5(CHK)(cr)	
Syntax description	$	First leading code
	ID	Address of setting module 00-FF(HEX)
	5	Command for reading reset status
	CHK	Checksum
	(cr)	Carriage return
Response	!IDS(CHK)(cr)	S =1 has been reset S=0 not been reset
	?ID(CHK)(cr)	Command Invalid

Example:

Send command:$015…Read the TRP-C24's reset states .

Response: " !011 " …….. The TRP-C24 has been reset.

The module will return the flag to " 1 " after system restart.

6-12. Change the module's name

Command	~IDONN(CHK)(cr)	
Syntax description	~	First leading code
	ID	Address of setting module 00-FF(HEX)
	O	Command for rename TRP-C24's name
	NN	NN:TRP-C24's name, Max.6 characters
	CHK	Checksum
	(cr)	Carriage return
Response	!ID(CHK)(cr)	Command valid
	?ID(CHK)(cr)	Command Invalid

Example:

Send command:"~01OTRYCOM"….. Change the TRP-C24's name become to "TRYCOM".

Response:"!01"……. . Command valid.

Then send the command "$01M"…read the TRP-C24's name.

Response:"!01TRYCOM"… .The TRP-C24's name is "TRYCOM".

6-13. Set the module's LED operating mode

Command	~IDLEDA(CHK)(cr)	
Syntax description	~	First leading code
	ID	Address of setting module 00-FF(HEX)
	LED	Set the module's LED operating mode
	A	A=0 Turn off all LEDS, when logic "1" ON A=1 Turn on all LEDS, when logic "1" OFF
	CHK	Checksum
	(cr)	Carriage return
Response	!ID(CHK)(cr)	Command valid
	?ID(CHK)(cr)	Command Invalid

Example:
Send command: " ~01LED0 " …... Turn off all LED, when logic " 1 " ON.
Response: " !01 " …….. Command valid.

6-14. Enable watchdog and set the timeout value

Command	~IDWENN(CHK)(cr)	
Syntax description	~	First leading code
	ID	Address of setting module 00-FF(HEX)
	WE	Watchdog Enable
	NN	Set the watchdog time(NN:00-FF) One Unit=0.1 Sec FF: MAX. 25.5 Sec
	(cr)	Carriage return
Response	!ID(CHK)(cr)	Command valid
	?ID(CHK)(cr)	Command Invalid

Example:
Send Command: " ~01WE**FF** " ….. Set the watchdog time to 25.5 Sec.
Response: " !01 " …….. Command valid, When module count to 25.5 Sec the watchdog will into safe mode ,then PWR LED will flashing, before timeout if host send " ~** ", the watchdog will re-counted!.

*In safe mode, all commands are invalid , any command sent in safe mode will be made no response but "IDWE", so in safe mode user can not change output states.
*Reset and power fail will not affect watchdog mode.

6-15. Disable watchdog

Command	~IDWD(CHK)(cr)	
Syntax description	~	First leading code
	ID	Address of setting module 00-FF(HEX)
	WD	Disable watchdog
	(cr)	Carriage return
Response	!ID(CHK)(cr)	Command valid
	?ID(CHK)(cr)	Command Invalid

Example:

Send Command:"~01WD"….. Watchdog disable!.

Response:"!01"……. . Command valid, System LED will stop flashing!.

6-16 Read watchdog timeout value

Command	~IDWR(CHK)(cr)	
Syntax description	~	First leading code
	ID	Address of setting module 00-FF(HEX)
	WR	Read watchdog timeout value
	CHK	Checksum
	(cr)	Carriage return
Response	!IDWANN (CHK)(cr) !ID (CHK)(cr)	W: watchdog A=E: watchdog enable D: watchdog disable or safe mode NN: watchdog timeout value
	?ID(CHK)(cr)	Command Invalid

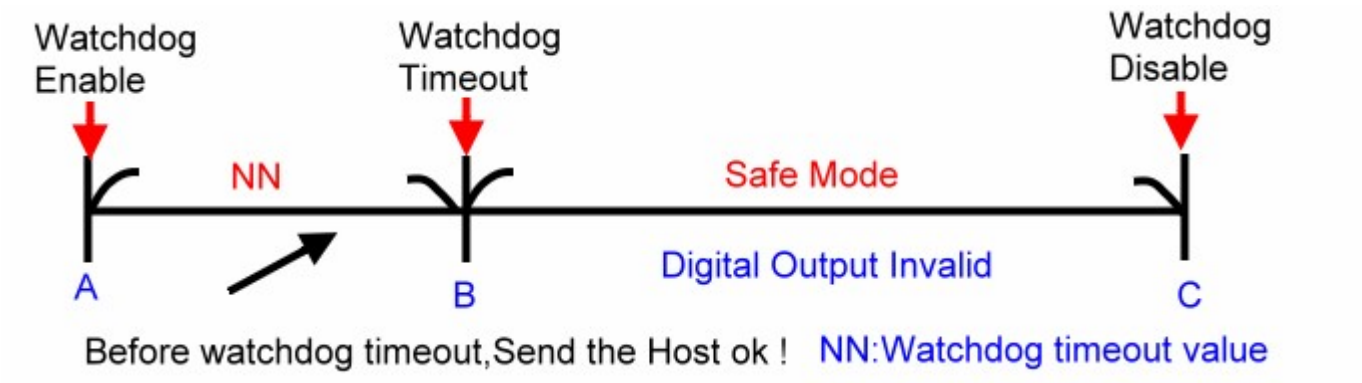
Example:

Send Command: " ~01WR " …. Read watchdog timeout value.

Response: " !01WD0F " ……. . Command valid, set the watchdog timeout is " 0F " ..1.6 Sec

6-17. System stand by (Host OK!)

Command	~**(CHK)(cr)	
Syntax description	~	First leading code
	**	Host ok!
	CHK	Checksum
	(cr)	Carriage return
Response		No Response



In watchdog enable status, the Host send “Host Ok!” command before watchdog timeout (B) to drive the watchdog timer re-count before timeout, when the host does not send the command before watchdog timeout, the module go to the safe mode. In safe mode, PWR LED will flashing, the digital output will not be changed until the watchdog disable..

6-18. Read power on/safe value

Command	~ID4V(CHK)(cr)	
Syntax description	~	First leading code
	ID	Address of setting module 00-FF (HEX)
	4	Read power on/safe digital IO value
	V	V=P: Power On V=S: Safe value
	CHK	Checksum
	(cr)	Carriage return
Response	!IDHHLL (CHK)(cr)	HH: DO15~DO8 LL:DO7~DO0
	?ID(CHK)(cr)	Command Invalid

Example:

Send Command:~014S…….Read safe mode digital output states.

Response: " !01080F”……. . Command valid, safe mode digital output states is ”080F”.

6-19. Save exiting digital output states to power on or safe mode

Command	~ID5V(CHK)(cr)	
Syntax description	~	First leading code
	ID	Address of setting module 00-FF(HEX)
	5	Save the current digital output is save or power on mode
	V	V=P Power On V=S Safe value
	(cr)	Carriage return
Response	!ID (CHK)(cr)	Command valid
	?ID(CHK)(cr)	Command Invalid

Example:
Send Command:"#010A0F"…Digital output DO7~DO0= "0000 1111"
Response: " !01 " …….. Command valid!

Then Send Command : " ~015P " ⋯.Set the digital output for power on ,.After power fail or reset , the module will load current .

6-20. Save existing digital input states

Command	#**(CHK)(cr)	
Syntax description	#	First leading code
	**	Save current digital IO status(All modules on line).
	CHK	Checksum
	(cr)	Carriage return
Response		No Response

Example:
Send Command: " #** " . Save current digital input/output states of all modules on line

6-21. Read synchronized data

Command	$ID4(CHK)(cr)	
Syntax descrption	$	First leading code
	ID	Address of setting module 00-FF(HEX)
	4	Read synchronized data
	CHK	Checksum
	(cr)	Carriage return
Response	!AHHLL00(CHK)(cr)	Command valid A=1:Have been send"#**" A=0:Have been read HH: DO15-DO8 output status LL: DO7-DO0 I output status
	?ID	Before send this command do not send the command "#**"

Example:

Send Command: " #** " ……Save current digital IO states(All modules on line).

Then send command: " $014 " …. Read synchronized data.

Response: " !1010E00 " …. " 1 " :Have been send the " #**,the DO states valid is " 010E "

*After Read synchronized data, A value is"1", Read again become to"0".

7. Modbus/RTU Command Description

The TRP-C24 support Modbus/RTU protocol, the serial communication data format is

Start bit: 1,

Data bit: 8,

Parity check: None,

Stop bit: 1,

Baud-rate: 1200bps~115200bps.

Modbus Syntax:

Command Format :ID(HEX)+FC(HEX)+SU(HEX)+DA(HEX) or RC(HEX)+CRC16(HEX).

Response Format : ID(HEX)+FC(HEX)+SU(HEX)+DA(HEX) or RC(HEX)+CRC16(HEX).

Error Format: ID(HEX)+ FC(HEX)+ CRC16(HEX).

ID: RS485 Device Address (HEX)…..1~247 1Byte.

FC: Function Code (HEX)…1 Byte.

SU: Sub Function (HEX)…..1 Byte.

DA: Data Format….No Limit.

RC: Reserved code…No Limit.

CRC: Cyclic Redundancy Check…2 Byte .

Error Response: If CRC IS mismatches error the response is empty!

7-1. Modbus RTU Command List

Command List	Function Description	Index
ID 46 00 00 (CRC)	Read the module's name	7-2
ID 46 04 IP 00 00 00 (CRC)	Set up the module's address	7-3
ID 46 05 00 (CRC)	Read the module's configuration	7-4
ID 46 06 00 BD 00 00 00 00 00 00 (CRC)	Set up the module's configuration	7-5
ID 46 07 00 (CRC)	Read the module's Firmware	7-6
ID 46 08 00(CRC)	Read module reset status	7-7
ID 46 09 00(CRC)	Set up the module reset	7-8
ID 46 0B WS 00 (CRC)	Set up watchdog timeout value	7-9
ID 46 0C 00 (CRC)	Read watchdog status	7-10
ID 46 0D 0S 00 (CRC)	Set up LED ON/OFF	7-11
ID 46 27 HH LL 00 (CRC)	Set up power on mode	7-12
ID 46 28 00 (CRC)	Read power on mode value	7-13
ID 46 29 HH LL 00 (CRC)	Set up safe mode value	7-14
ID 46 2A 00 (CRC)	Read safe mode value	7-15
ID 05 00 NN DD 00(CRC)	Set up single channel digital output status	7-16
ID 0F 00 00 00 10 02 HH LL(CRC)	Set up the all digital output status	7-17
ID 01 00 00 00 10 (CRC)	Read digital output status	7-18
ID 02 00 00 00 10 (CRC)	Read digital output status	7-19

7-2.Read the module's name

Command	ID 46 00 00 (CRC)	
Syntax Description	ID	Address of setting module 1~247
	46	Function code
	00	Read module's name
	00	Reserved code
Response	ID 46 00 00 0C 24 00 (CRC)	ID 46 00 00 ….Module command Line 0C 24 :Module's Name is C24
	ID C6 00(CRC)	ID C6 (CRC) C6:Function Code 00: Reserved code

EX: Send Command: " 01 46 00 00 " …….Read the TRP-C24's name.

Response: " 01 46 00 00 0C 24 00 "……Module's name is C24.

Error Response: "01 C6 00"……Error code.

7-3.Set up the module's address

Command	ID 46 04 IP 00 00 00 (CRC)	
Syntax Description	ID	Address of setting module 1~247
	46	Function Code
	04	Set up module's ID
	IP	New module's ID
	00 00 00	Reserved code
Response	ID 46 04 00 00 00 00 (CRC)	ID 46 04 00 00 00 00 ….Command valid
	ID C6 00(CRC)	ID C6 (CRC) C6:Function Code 00: Reserved code

EX: Send Command: " 02 46 04 03 00 00 00 " …….Set up the new ID is "03".
Response: " 01 46 04 00 00 00 00 "……New ID is 03.
Error Response: "01 C6 00"……Error code.

7-4.Read the module's configuration

Command	ID 46 05 00 (CRC)	
Syntax Description	ID	Address of setting module 1~247
	46	Function Code
	05	Read module's configuration
	00	Reserved code
Response	ID 46 05 00 **BD** 00 00 00 00 00 00 (CRC)	ID 46 05 00 ……Module command Line **BD**:Baud Rate ***See 6-2*** 00 00 00 00 00 00 : Reserved code
	ID C6 00(CRC)	ID C6 (CRC) C6:Function Code 00: Reserved code

Example:
Send Command: " 01 46 05 00 " …….Read TRP-C24's configuration.
Response:"01 46 05 00 **06** 00 00 00 00 00 00 "……06:BD=9600…See 8-2 baud rate table.
Error Response: "01 C6 00"……Error code.

7-5.Set up the module’s configuration

Command	ID 46 06 00 BD 00 00 00 00 00 00 (CRC)	
Syntax Description	ID	Address of setting module 1~247
	46	Function Code
	06	Set up module’s configuration
	00 **BD** 00 00 00 00 00 00	**BD**: Baud-Rate….See 8-2
Response	ID 46 06 00 00 00 00 00 00 00 00 (CRC)	ID 46 06 00 ……Module command Line 00 00 00 00 00 00 00 00 : Reserved code
	ID C6 00 (CRC)	ID C6 (CRC) C6:Function Code 00: Reserved code

Example:

Send Command: " 01 46 06 00 **0A** 00 00 00 00 00 00 " …….Set up TRP-C24’s configuration.

Response:”01 46 06 00 00 00 00 00 00 00 00 “….Baud-Rate set to 115200.

Error Response: “01 C6 00”……Error code.

7-6.Read the module’s Firmware

Command	ID 46 07 00 (CRC)	
Syntax Description	ID	Address of setting module 1~247
	46	Function Code
	07	Read module’s Firmware
	00	Reserved code
Response	ID 46 07 **YY MM DD** 00(CRC)	ID 46 07 ……Module command Line **YY**:Year **MM** :Month **DD:**Date 00 : Reserved code
	ID C6 00 (CRC)	ID C6 (CRC) C6:Function Code 00: Reserved code

Example:

Send Command: " 01 46 07 00 " …….Set up TRP-C24’s configuration.

Response:”01 46 07 07 04 06 00“…APR. 04.2007 TRP-C24 Firmware Version.

Error Response: “01 C6 00”……Error code.

7-7.Read module reset status

Command	ID 46 08 00(CRC)	
Syntax Description	ID	Address of setting module 1~247
	46	Function Code
	08	Read Module Reset status
	00	Reserved code
Response	ID 46 08 0D 00 (CRC)	D=0 Have been read, D=1 Have been reset
	ID C6 00 (CRC)	ID C6 (CRC) C6:Function Code 00: Reserved code

Example:
Send Command: " 01 46 08 00 " …Read the module's digital input status.
Response:"01 46 08 1 00 ..have been reset.

7-8.Set up the module reset

Command	ID 46 09 00	
Syntax Description	ID	Address of setting module 1~247
	46	Function Code
	09	Module reset
	00	Reserved code
Response	ID 46 09 00 (CRC)	Command valid
	ID C6 00 (CRC)	ID C6 (CRC) C6:Function Code 00: Reserved code

Example:
Send Command: " 01 46 09 00 " …Read the module's digital input status.
Response:"01 46 09 00 ..Command valid.
Error Response: "01 C6 00"…Error code.

7-9.Set up watchdog timeout value

Command	ID 46 0B WS 00 (CRC)	
Syntax Description	ID	Address of setting module 1~247
	46	Function Code
	2B	Set up power on mode
	WS	WS=00 Watchdog Disable Watchdog timer from 01~FF (100ms~25.5 Sec)
	00	Reserved code
Response	ID 46 0B 00(CRC)	00 ID 46 0B 00 ……Command valid
	ID C6 00 (CRC)	ID C6 (CRC) C6:Function Code 00: Reserved code

Example:

Send Command: " 01 46 0B 05 00 " …….Set up TRP-C24's watchdog timer=500ms.

Response:"01 46 0B 00"…Command valid.

Error Response: "01 C6 00"……Error code.

7-10.Read watchdog status

Command	ID 46 0C 00 (CRC)	
Syntax Description	ID	Address of setting module 1~247
	46	Function Code
	0C	Read watchdog value
	00	Reserved code
Response	ID 46 0C WT (CRC)	ID 46 0C ……Module command line WT: Watch dog vale
	ID C6 00 (CRC)	ID C6 (CRC) C6:Function Code 00: Reserved code

Example:

Send Command: " 01 46 0C 00 " …Read TRP-C24's watchdog value.

Response:"01 46 0C 01 .

Error Response: "01 C6 00"…Error code.

7-11.Set up LED ON/OFF

Command	ID 46 0D 0S 00 (CRC)	
Syntax Description	ID	Address of setting module 1~247
	46	Function Code
	0D	Set Up LED Status Value
	0S	S = 0 Turn on all LED when DIO enable off S = 1 Turn off all LED when DIO enable on
	00	Reserved code
Response	ID 46 0D 00 (CRC)	ID 46 0D ……Command valid
	ID C6 00 (CRC)	ID C6 (CRC) C6:Function Code 00: Reserved code

Example:

Send Command: " 01 46 0D 01 00.

Response:"01 46 0D 00.

Error Response: "01 C6 00"…Error code.

7-12.Set up power on mode

Command	ID 46 27 HH LL 00 (CRC)	
Syntax Description	ID	Address of setting module 1~247
	46	Function Code
	27	Set up power on mode
	HH LL	HH LL: Power on digital status
	00	Reserved code
Response	ID 46 27 00(CRC)	00 ID 46 27 00 ……Command valid
	ID C6 00 (CRC)	ID C6 (CRC) C6:Function Code 00: Reserved code

Example:

Send Command: " 01 46 27 01 02 00 " …….Set up TRP-C24's power on value.

Response:"01 46 27 00"…Command valid .

Error Response: "01 C6 00"……Error code.

7-13.Read power on mode value

Command	ID 46 28 00 (CRC)	
Syntax Description	ID	Address of setting module 1~247
	46	Function Code
	28	Read power on value
	00	Reserved code
Response	ID 46 28 **HH LL** (CRC)	00 46 28 ……Module command line HH LL: Power on value
	ID C6 00 (CRC)	ID C6 (CRC) C6:Function Code 00: Reserved code

Example:

Send Command: " 01 46 28 00 " …….Read TRP-C24's power on value.

Response:"01 46 01 02 "…Command valid.

Error Response: "01 C6 00"……Error code.

Power on mode: Digital output states when power on.

7-14.Set up safe mode value

Command	ID 46 29 HH LL 00 (CRC)	
Syntax Description	ID	Address of setting module 1~247
	46	Function Code
	29	Set up safe mode value
	HH LL	HH LL: Safe mode digital output value
	00	Reserved code
Response	ID 46 29 00(CRC)	ID 46 29 00 ……Command valid
	ID C6 00 (CRC)	ID C6 (CRC) C6:Function Code 00: Reserved code

Example:

Send Command: " 01 46 29 00 FF 00 " …….Set up TRP-C24's safe mode value.

Response:"01 46 29 00"… Command valid.

Error Response: "01 C6 00"……Error code.

Power on mode: Digital output states when watchdog timeout.

7-15.Read safe mode value

Command	ID 46 2A 00 (CRC)	
Syntax Description	ID	Address of setting module 1~247
	46	Function Code
	2A	Read power on mode
	00	Reserved code
Response	ID 46 2A HH LL (CRC)	00 46 2A ……Module command line HH LL: Safe mode value
	ID C6 00 (CRC)	ID C6 (CRC) C6:Function Code 00: Reserved code

Example:

Send Command: " 01 46 2A 00 " …….Read TRP-C24's safe mode value.

Response:"01 46 2A 00 FF "…Command valid.

Error Response: "01 C6 00"……Error code.

7-16.Set up single channel digital output status

Command	ID 05 00 NN DD 00(CRC)	
Syntax Description	ID	Address of setting module 1~247
	05	Function Code
	00 NN	Set up module's digital output channel number NN:01~10 (Hex)
	DD	Set up module's digital output value DD=00 OFF, DD=FF ON
	00	Reserved code
Response	ID 05 00 NN DD 00 (CRC)	ID 05 00 NN DD 00……Command valid
	ID 85 FF (CRC)	Watchdog mode status
	ID 85 ER (CRC)	ID 85 :Function Code ER=00 Syntax error ER=01 Data Format error ER=02 Start channel error ER=03 I/O out of range

*Single-Channel mode (Output control for 1 Bit).

Example:

Send command : " 01 05 03 00 00"……Set up the DO3 OFF.

Response: " 01 05 00 03 00 00 " ….. Command valid.

Send command : " 01 05 00 08 FF 00"……Set up the DO8 ON.

Response: " 01 05 00 08 FF 00 " ….. Command valid.

7-17.Set up the digital output status

Command	ID 0F 00 00 00 0F BC HH LL (CRC)	
Syntax Description	ID	Address of setting module 1~247
	0F	Function Code
	00 00	Start channel number, Start channel is 0
	00 10	Output channel number 10(hex)=16 Channel
	BC	Byte counter =02
	HH LL	Set up the digital output value
Response	ID 0F 00 00 00 10 (CRC)	Command valid
	ID 8F FF (CRC)	Watchdog mode status
	ID 8F ER (CRC)	ID 8F :Function Code ER=00 Syntax error ER=01 Data Format error ER=02 Start channel error ER=03 I/O out of range

*Multi-Channel mode (Output control for 2 BYTE)

Example:

Send command : " 01 0F 00 00 00 10 02 **80 3F** "…..Set up the DO0~5 and D0F ON.

Response: " 01 0F 00 00 00 10 " ….. Command valid.

*When the module is in safe mode, any digital output command are invalid, you will get the response “ID 8F FF”, which means the system is in safe mode, you can't change output status until the watchdog disable.

*Reset and power fail will not affect watchdog mode.

7-18. Read digital output value

Command	ID 01 00 00 00 10 (CRC)	
Syntax Description	ID	Address of setting module 1~247
	01	Function Code
	00 00	Start channel number, Start channel is 0
	00 10	Read output channel number 10(hex)=16 Channel
Response	ID 01 BC HH LL	ID 01:Command Line BC: Byte counter HH LL: Digital output read back value
	ID 81 ER (CRC)	ID 81 :Function Code ER=00 Syntax error ER=01 Data Format error ER=02 Start channel error ER=03 I/O out of range

Example:

Send command : " 01 01 02 00 10"…..Read DO value.

Response: " 01 01 02 00 0F " ….. DO read back value.

7-19.Read digital output value

Command	ID 02 00 00 00 10(CRC)	
Syntax Description	ID	Address of setting module 1~247
	02	Function Code
	00 00	Start channel number, Start channel is 0
	00 10	Read output channel number 10(hex)=16 Channel
Response	ID 02 BC HH LL	ID 02:Command Line BC: Byte counter HH LL: Digital output read back value
	ID 82 ER (CRC)	ID 82 :Function Code ER=00 Syntax error ER=01 Data Format error ER=02 Start channel error ER=03 I/O out of range

8. How to use the utility for windows

The TRPCOM utility can help you to test the module's data transmit and receive, digital input and output communication status. User may download TRPCOM software from TRYCOM web www.trycom.com.tw.

1.The "Setting " function is for user to initiate the software to set the Com Port from 1 to 8 and setting the Baud-Rate from 1200 to 19200,Checksum Enable or Disable. ⋯See Figure 1

*The Module Factory Setting is "9600" and "ID" is 01, Checksum is Disable.

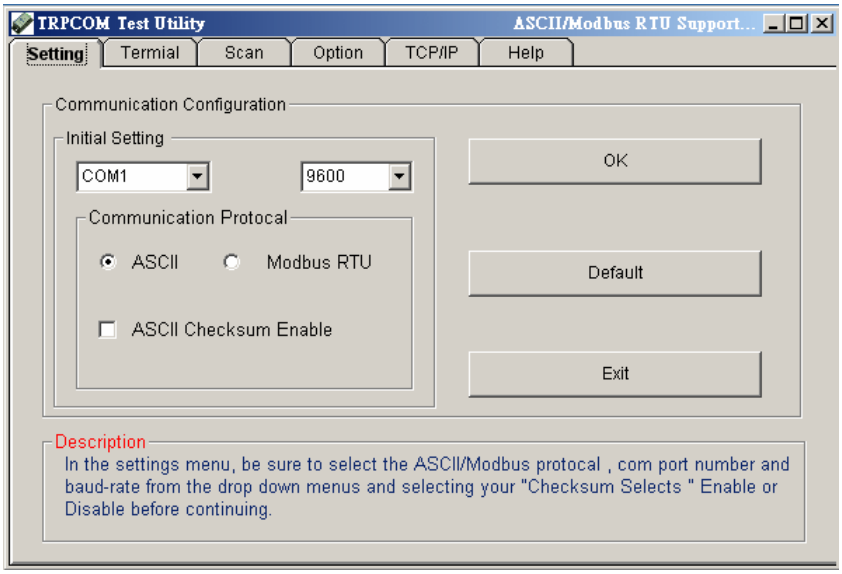


Figure 1

2.The "Terminal" function is for user to input command, user can control all of module's digital input/output status or wait to get module response status ⋯See Figure 2.

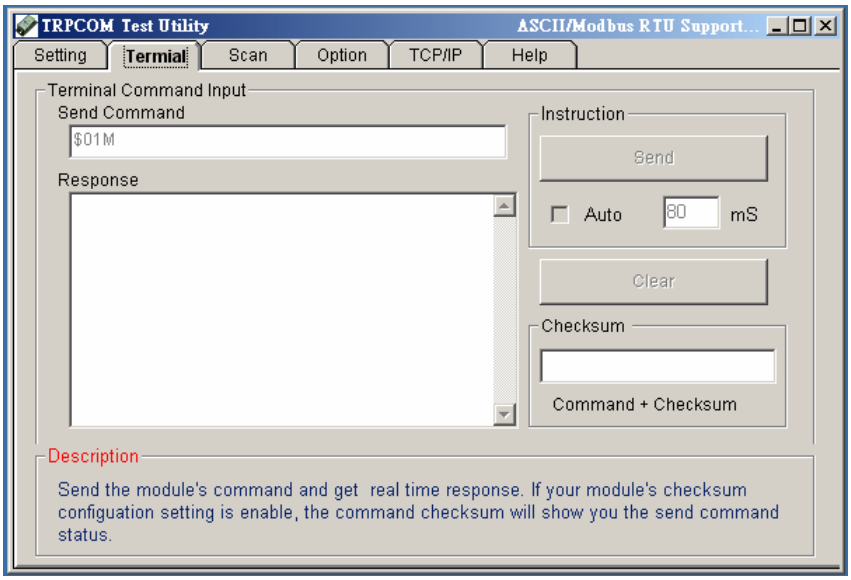


Figure 2

If you don't know the baud-rate, ID or, Checksum you may select "Scan" to find the module's setting.

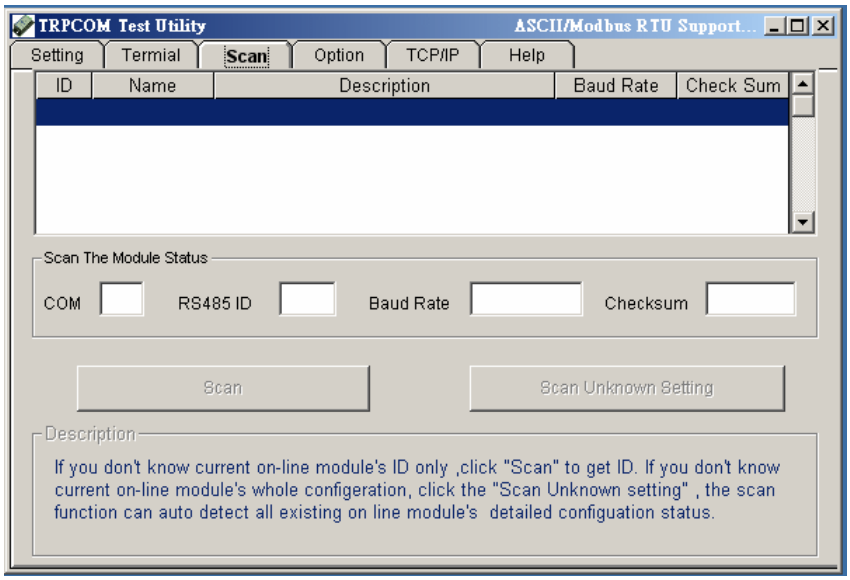


Figure 3

9. Application

10. Using the Modbus poll for test the TRP-DIO and AIO

The **Modbus poll** is the very popular utility that supports the Modbus RTU/ASCII and Modbus TCP/IP, you can free download that for test the any TRP-DIO and AIO basic Modbus function. The download website is [http://www.modbustools.com/modbus_poll.asp.](http://www.modbustools.com/modbus_poll.asp)